

**RESPONSE UNDER 37 C.F.R. § 1.116  
EXPEDITED PROCEDURE**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the Application of:	Confirmation No.: 7383
Kenji DOSAKA et al.	Art Unit: 1795
Application No.: 10/717,898	Examiner: Kishor MAYEKAR
Filed: November 21, 2008	Attorney Docket No.: 107348-00389

**For: PROCESS FOR DECREASING CONTENT OF PARTICULATE MATERIAL  
CONTAINED IN EXHAUST GAS FROM LEAN BURN ENGINE OR THE LIKE**

DO NOT ENTER: /KM/

06/23/2008

**AMENDMENT UNDER 37 C.F.R. §1.116**

**MAIL STOP AF**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

June 17, 2008

Sir:

In reply to the Office Action dated March 26, 2008, please amend the above-identified application as follows:

Amendments to the claims, as reflected in the listing of claims, begin on page 2; and

Remarks begin on page 5.

**Amendments to the claims:**

1. (Currently Amended) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine, comprising the steps of:

heating the exhaust gas at a temperature greater than 70°C;

generating plasma in the exhaust gas discharged from the lean burn engine, the exhaust gas containing the particulate material, to thereby produce a plurality of  $O(^1D)$  radicals and subsequently produce a plurality of per-hydroxide excited species; and

oxidizing the particulate material by the per-hydroxide excited species;

wherein a decrement rate of the particulate material is greater than 84%.

2. (Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 1, wherein, in plasma generating conditions, an intensity E of an electric field is set at a value equal to or larger than 3.0 kV/mm, and a power density Dw is set at a value equal to or larger than 1 W/cm<sup>3</sup>.

3. (Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 1 or 2, wherein a surface of at least one of opposed electrodes which is opposed to another electrode is covered with a dielectric.

4. (Withdrawn - Currently Amended) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine and

comprising a carbon solid fraction and a soluble organic fraction covering the carbon solid fraction, the process comprising the steps of: subjecting the soluble organic fraction to the reaction with oxygen under the presence of a catalyst to oxidize the soluble organic fraction; generating plasma in the exhaust gas to produce plasma excited species; and oxidizing the carbon solid fraction by the plasma excited species; wherein a decrement rate of the particulate material is greater than 84%.

5. (Withdrawn - Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 4, wherein the catalyst is at least one selected from the group consisting of Pt, Pd, Rh, Cu Ag and Au.

6. (Withdrawn - Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 4 or 5, wherein, in plasma generating conditions, an intensity E of electric field is set at a value equal to or larger than 3.0 kV/mm, and a power density Dw is set at a value equal to or larger than 1 W/cm<sup>3</sup>.

7. (Withdrawn - Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 4 or 5, wherein the surface of at least one of opposed electrodes which is opposed to the other electrode is covered with a dielectric.

8. (Withdrawn - Currently Amended) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine, comprising the steps of: generating plasma in the exhaust gas discharged from the

lean burn engine and containing the particulate material to produce a plurality of nitrogen dioxide molecules and a plurality of ozone molecules; and oxidizing the particulate material by the nitrogen dioxide molecules and the ozone molecules; wherein a decrement rate of the particulate material is greater than 84%.

9. (Withdrawn – Currently Amended) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine, comprising the steps of: generating plasma in the exhaust gas discharged from the lean burn engine and containing the particulate material to produce a plurality of nitrogen dioxide molecules and a plurality of ozone molecules; oxidizing the particulate material by the nitrogen dioxide molecules and the ozone molecules; and subjecting the particulate material to the reaction with the nitrogen dioxide molecules and the ozone molecules in the presence of a catalyst to oxidize the particulate material; wherein a decrement rate of the particulate material is greater than 84%.

10. (Withdrawn - Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 9, wherein the catalyst is at least one selected from the group consisting of Pt, Pd, Rh, Cu Ag and Au.

11. (Withdrawn - Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 8, 9 or 10, wherein, in plasma generating conditions, an intensity E

of electric field is set at a value equal to or larger than 3.0 kV/mm, and a power density Dw is set at a value equal to or larger than 1 W/cm<sup>3</sup>.

12. (Withdrawn - Previously Presented) A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine according to claim 8, 9 or 10, wherein the surface of at least one of opposed electrodes which is opposed to the other electrode is covered with a dielectric.

## REMARKS

The Office Action dated March 26, 2008 has been received and carefully noted. The above amendments and following remarks are being submitted as a full and complete response thereto. Claims 1-3 are pending, and claims 4-12 are withdrawn in this application. By this amendment, claims 1, 4 and 8-9 are amended. Support for the subject matter of the amendment to the claims can be found in the specification at, for example, Tables 2, 4 and 6, page 17, lines 1-8, or page 41, lines 1-9. Reconsideration of the rejection of the claims is respectfully requested.

The Applicants gratefully acknowledge the indication that claim 2 contains allowable subject matter.

The Office Action rejects claims 1 and 3 under 35 U.S.C. § 102(b) / 103(a) over Caren et al. (U.S. Patent No. 6,029,442) in light of Evans et al. (U.S. Patent No. 6,479,023). The rejection is respectfully traversed.

In particular, the above-identified application claims a process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine, comprising the steps of heating the exhaust gas at a temperature greater than 70° C, generating plasma, and then oxidizing the particulate material, wherein a decrement rate of the particulate material is greater than 84%, as recited in independent claim 1.

Caren teaches an apparatus and a method for the reduction of pollutants in the exhaust stream of a combustion engine (Abstract). Caren further teaches using a corona discharge device to generate a reaction in the exhaust gas that produces

highly oxidizing free radicals, and that a catalytic converter 13 located at the underbody of an automobile and situated in the exhaust gas stream 18 from the engine, includes any device provided for treating exhaust gases from the combustion of a fuel such as gasoline or any other fuel where a catalytic converter can be used to reduce at least one pollutant from combustion (column 4, line 66 - column 5, line 17; column 7, line 53 - column 8, line 13; column 10, lines 16-46). However, and as already argued in the December 12, 2007, response, Caren fails to disclose or suggest that a decrement rate of the particulate material is greater than 84%.

Evans teaches a system for converting particulate matter in exhaust gases (Abstract), but fails to cure the above-discussed deficiencies in Caren in disclosing or rendering obvious the features of independent claim 1. Thus, independent claim 1, and its dependent claim 3, are patentable over a combination of the applied references. Accordingly, withdrawal of the rejection of the claims under 35 U.S.C. § 102(b) / 103(a) is respectfully requested.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Dkt. No. 017348-00389.**

Respectfully submitted,



---

Tarik M. Nabi  
Registration Number 55,478

Customer Number 004372  
ARENT FOX LLP  
1050 Connecticut Avenue, NW, Suite 400  
Washington, DC 20036-5339  
Telephone: 202-857-6000  
Fax: 202-638-4810

TMN